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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H01M 2/10, 10/50, 10/52

A1

(11) International Publication Number: WO 98/31059

(43) International Publication Date: 16 July 1998 (16.07.98)

(21) International Application Number: PCT/US97/00805

(22) International Filing Date: 13 January 1997 (13.01.97)

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(81) Designated States: AU, BR, CA, FI, JP, KR, MX, NO, RU, SG, UA, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: MECHANICAL AND THERMAL IMPROVEMENTS IN METAL HYDRIDE BATTERIES, BATTERY MODULES AND BATTERY PACKS

(57) Abstract

Mechanically and thermally improved rechargeable batteries, modules and fluid–cooled battery systems are disclosed herein. The battery is prismatic in shape with an optimized thickness to width to height aspect ratio which provides the battery with balanced optimal properties when compared to prismatic batteries lacking this optimized aspect ratio. The optimized thickness, width and height allow for maximum capacity and power output, while eliminating deleterious side effects. The battery case allows for unidirectional expansion which is readily compensated for by applying external mechanical compression counter to that direction. In the module (32), the batteries are bound within a bundling/compression means under external mechanical compression which is optimized to balance outward pressure due to expansion and provide additional inward compression to reduce the distance between the positive and negative electrodes, thereby increasing overall battery power. The fluid–cooled battery pack (39) includes a battery–pack case (40) having coolant inlets (41) and outlets (42); battery modules within the case such that they are spaced from the case walls and from each other to form coolant flow channels (43) along at least one surface of the bundled batteries; and at least one coolant transport means (44). The width of the coolant flow channels allows for maximum heat transfer. Finally, the batteries, modules and packs can also include means for providing variable thermal insulation to at least that portion of the rechargeable battery system which is most directly exposed to ambient thermal conditions, so as to maintain the temperature of the system within the desired operating range thereof under variable ambient conditions.